Chapter 1: Drainage (Temporary & Permanent)

1.1 Introduction

The purpose of this chapter is to set guidelines for the Work Zone Traffic Control Section concerning drainage and how it affects the phasing in Traffic Control Plans.

Drainage is used to keep roadways and roadsides clear from ponding/standing water, to allow safe passage of all vehicles, and to extend the life of the pavement. Both temporary and permanent drainage are factors in developing a Temporary Traffic Control Plan. All drainage issues need to be addressed by Roadway Design Unit, Structure Design Unit, Hydraulics Unit and/or Work Zone Traffic Control Section with the Division Construction Engineer during the Final Design / Combined field inspections. If temporary drainage is required, the hydraulics engineer is to be notified by the FDFI.

1.2 Definitions & Abbreviations

Drainage – A natural or artificial means of intercepting and removing surface or subsurface water (usually by gravity) from the roadways and roadsides.

Ponding/Standing – A term used when water collects in an area and resembles a pond.

Detention – The temporary storage of excess storm water.

Retention – The permanent storage of excess storm water.

Phased – A drainage written sequence of how to install the proposed and/or temporary drainage (found in Traffic Control Plans).

Open-cut – A pipe installation/removal process that excavates the existing ground and/or pavement for the placement/removal of a crosspipe.

Trenchless construction – A pipe installation process that allows the crosspipe to be placed without excavation. Examples are the auger boring (same as bore and jacking), microtunneling, Tunnel Boring Method (TBM) and pipe ramming.

Plug and fill – In reference to a pipe, plug the ends of a pipe with bricks or cement and fill the pipe with flowable material. Process performed to allow existing pipe to remain in place.

Retrofitting – In reference to a pipe, place a smaller diameter pipe inside of a larger existing pipe and fill any voids with flowable material. Rarely done.

Cap/Cover – A load bearing cover which temporarily closes the top of a drainage structures until the appropriate time.

Traffic Bearing Inlet/Grate/Junction Box – Drainage structures that allow water to flow through to remove water from the roadways and roadsides.

RCP – Reinforced Concrete Pipe

CSP – Corrugated Steel Pipe

TBGI – Traffic Bearing Grated Inlet

TBJB – Traffic Bearing Junction Box

TDE – Temporary Drainage Easement

DI – Drainage Inlet

RCBC – Reinforced Concrete Box Culvert

CB – Catch Basin

HW – Headwall

1.3 Design Criteria

Areas in the work zone where the ponding/standing of storm water could pose a threat to the traveling public:

- Median crossovers
- Low lying areas or sags
- Portable concrete barriers on both edge lines (creating a cattle chute effect where water can pond)
- Super elevations (Low Side)

Operations where temporary or permanent drainage will have to be written out in the Phasing of the Traffic Control Plan:

- Open cut installation
- Staged box culvert construction where water flow must be maintained during construction.
- Good Technique is to identify all sag vertical curves located in profile view in order to know where storm water will collect. Also identify all elevated/grade change areas found by reviewing the x-sections for possible temporary drainage needs.

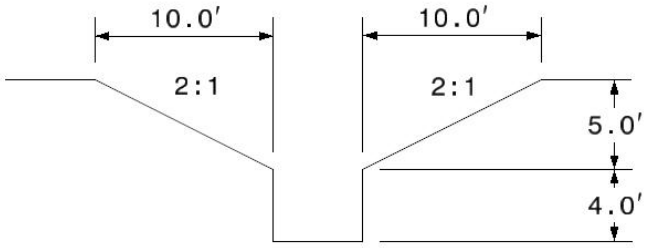
1.4 Other Considerations

REMOVAL OF DRAINAGE:

- To minimize cost, pipes can be plugged and filled, rather than removed. The Hydraulics Unit makes the initial recommendation of removal or plug and fill. However, the decision may be revised after receiving recommendations from the Division Construction Engineer, the Work Zone Traffic Control Section and the Roadway Design Unit. For example, if a pipe is covered by a paved road and a high fill (5 feet+), it may be cost effective to plug and fill than to remove. Also, if the traffic count is high, the plug and fill method is less disruptive to traffic. Not all issues are this straightforward and ultimately the Division Construction Engineer makes the final decision.

CONSTRUCTION METHODS/OPTIONS TO BE DISCUSSED AT FIELD INSPECTIONS FOR DRAINAGE PIPE INSTALLATION:

- Off-site detour.
- On-site detour.
- Trench boxes, temporary shoring or laybacks (any open cuts require a 2:1 lay back above the 4' height). Example: A layback for a 9' deep excavation will make width of the open cut more than 20' wide at the top.
- Trenchless construction



RESOURCES:

- Hydraulics Unit
- NCDOH Guidelines for Drainage Studies and Hydraulic Design Division Construction Engineer
- Work Zone Traffic Control Project and Project Design Engineers (Supervisors)
- AASHTO Roadside Design Guide

1.5 Guidelines

Temporary drainage can be encountered in work zones that have to be modified to accommodate changing traffic patterns. Temporary drainage problems normally occur with grade changes, widening of existing roadways, altering super elevations, flow diversion and/or stage construction. Temporary drainage is normally recommended and designed by the

Hydraulics Unit, however, the Work Zone Traffic Control Section may request additional temporary drainage due to phasing sequence.

Permanent drainage, both existing and proposed, is shown on the Roadway Plans and is designed by the Hydraulics Design and Structure Units. Coordination, either during the field inspections and/or constructability meetings, with these units is required to ensure that the construction of this drainage is adequately addressed in the Traffic Control Plans.